

## Sec. 5.6 Solve Rational Equations

Solve each equation

$$a. \frac{7}{x-2} = \frac{11}{2x-10}$$

Cross multiply.

$$7(2x-10) = 11(x-2)$$

$$\begin{array}{r} 14x - 70 = 11x - 22 \\ -11x \quad -11x \\ \hline \end{array}$$

$$3x - 70 = -22$$

$$+70 \quad +70$$

$$\frac{3x}{3} = \frac{48}{3}$$

$$x = 16$$

→ Extraneous if this value makes a denominator equal zero.

$$b. \frac{7}{x-1} - 5 = \frac{6}{(x+1)(x-1)}$$

*Extraneous Solutions*

*where the denominator equals 0.*

$$x-1=0$$

$$\boxed{x=1}$$

$$x^2-1=0$$

$$\begin{array}{r} +1 \quad +1 \\ \hline x^2=1 \end{array}$$

$$\sqrt{x^2} = \pm\sqrt{1}$$

$$\boxed{x = \pm 1}$$

$$\frac{7(x+1)\cancel{(x-1)}}{\cancel{x-1}} - 5(x+1)(x-1) = \frac{6(x+1)\cancel{(x-1)}}{\cancel{(x+1)}\cancel{(x-1)}}$$

$$7(x+1) - 5(x^2-1) = 6$$

$$\begin{array}{r} 7x+7 \\ -6 \\ \hline -5x^2+7x+6=0 \end{array}$$

$$-5x^2 + 7x + 6 = 0$$

$$-5x^2 - 3x + 10x + 6 = 0$$

$$-x(5x+3) + 2(5x+3) = 0$$

$$(-x+2)(5x+3) = 0$$

$$\begin{array}{r} -x+2=0 \\ -2 \quad -2 \\ \hline -x = -2 \\ \frac{-x}{-1} = \frac{-2}{-1} \end{array}$$

$$\frac{-x}{-1} = \frac{-2}{-1}$$

$$\boxed{x=2}$$

$$\begin{array}{r} 5x+3=0 \\ -3 \quad -3 \\ \hline 5x = -3 \\ \frac{5x}{5} = \frac{-3}{5} \end{array}$$

$$\frac{5x}{5} = \frac{-3}{5}$$

$$\boxed{x = -\frac{3}{5}}$$

Q.F.

Factor

a.c

$$-5 \cdot 6 = -30$$

$$1 \cdot 30$$

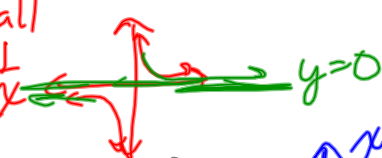
$$2 \cdot 15$$

$$\boxed{-3 \cdot 10}$$

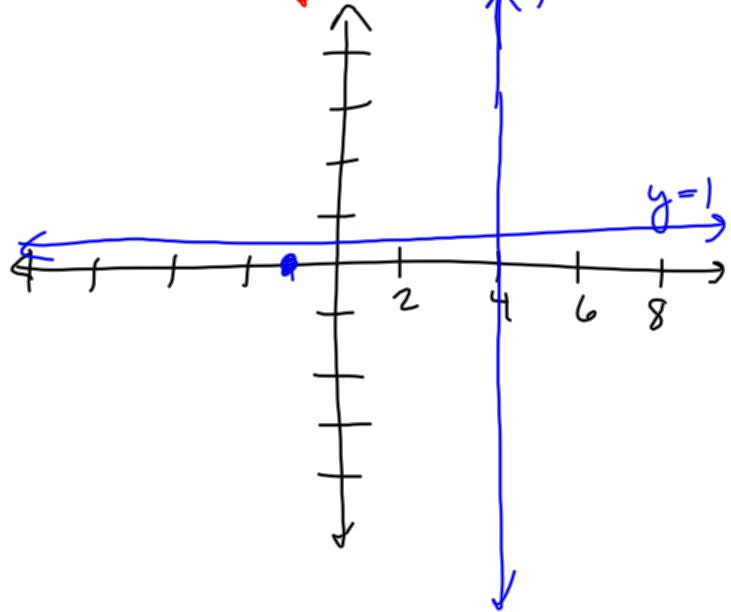
$$5 \cdot 6$$

*Check for extraneous solutions.*

Sample Item (14)

Recall  $y = \frac{1}{x}$  

$$y = \frac{x+1}{x-4}$$



Vertical asymptote  
 - where denominator equals zero  
 $x - 4 = 0$   
 $x = 4$

Horizontal asymptote  
 - Plug in a large value for  $x$  and approximate  $y$ .

$$x = 1000 \rightarrow y = \frac{1001}{996} \approx 1 \quad y = 1$$

Parent  
 $y = \frac{1}{x}$   
 $y = \frac{1}{1000}$   
 $y \approx 0$

Find the zero(s)  
 $y = 0$

$$y = \frac{x+1}{x-4}$$

(numerator = 0)

$$(x-4) \cdot 0 = \frac{x+1}{x-4} \cdot x-4$$

$$\begin{array}{r} 0 = x+1 \\ -1 \quad -1 \\ \hline -1 = x \end{array}$$